

Proposed Plan Medley Farm Drum Dump Superfund Site February 2012

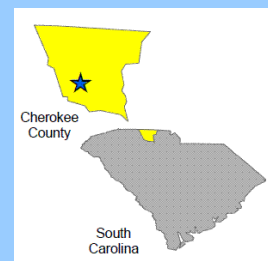
Site Name: Medley Farm Drum Dump Superfund Site

CERCLA ID #: SCD 980 558 142

Site Location: 887 Burnt Gin Road (County Hwy 72),
Gaffney, Cherokee County, South Carolina

Lead Agency: U.S. EPA, Region 4

Support Agency: South Carolina DHEC



Gaffney, SC

Introduction

This Proposed Plan presents EPA's Preferred Alternative for amending the 1991 Record of Decision (ROD) to clean up contaminated groundwater at the Medley Farm Drum Dump Superfund Site (Site), and provides the rationale for this preference. In addition, this Plan includes summaries of other cleanup alternatives evaluated for use at this Site. This document is issued by the United States Environmental Protection Agency (EPA), the lead agency for remediation activities. South Carolina Department of Health and Environmental Control (SCDHEC) is the support agency. EPA, in consultation with SCDHEC, will revise the 1991 remedy for groundwater at the Site after reviewing and considering all comments and information received during the 30-day public comment period. EPA may modify the Preferred Alternative or select another response action presented in this Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all the alternatives presented in this document.

EPA is issuing this Proposed Plan as part of its public participation responsibilities under Section 300.430(f)(2) of the **National Oil and**

MARK YOUR CALENDAR

PUBLIC COMMENT PERIOD:
March 6, 2012 – April 5, 2012

EPA will accept written comments on the Proposed Plan during the public comment period. See page 12 for submittal options.

PUBLIC MEETING:
March 20, 2012, at 7:00 p.m.

EPA will hold a public meeting to explain the Proposed Plan. Oral and written comments will also be accepted at the meeting. The meeting will be held at:

Corinth Baptist Church
190 Corinth Road
Gaffney, South Carolina

For more information, see the Administrative Record at the following locations:

Cherokee County Library, Gaffney Branch
300 East Rutledge Avenue, Gaffney, SC 29340,
(864) 487-2711

EPA Region 4 Records Center, 11th Floor,
61 Forsyth Street, S.W., Atlanta, GA 30303,
(404) 562-8946

Hazardous Substances Pollution Contingency Plan (NCP). This Proposed Plan summarizes information that can be found in greater detail in the original (1990) **Remedial Investigation/Feasibility Study (RI/FS)** report, the 2011 Focused Feasibility Study (FFS), and other documents contained in the **Administrative Record** file for this Site. EPA and the State encourage the public to review these documents to gain a more comprehensive understanding of the Site and Superfund activities that have been conducted at the Site. Terms **bolded** in this document are defined in the Glossary which appears on page 12.

Site History

The Medley Farm **Superfund** Site is presently undergoing a long-term cleanup action. The Site occupies approximately seven acres within a 62-acre tract of land formerly owned by Mr. Ralph Medley. It is located off Burnt Gin Road, about six miles south of the City of Gaffney. One residence is located about 250 feet east of the roadway, and the remainder of the tract lies to the southeast of the house. Land use in the Site vicinity has remained primarily agricultural and light residential. Until the early 1970s, the Medley property was maintained as woods and pasture land. From approximately 1973 to 1978, several area textile, paint, and chemical manufacturing firms paid to dispose of their industrial wastes on the Site property. The Site was first documented in 1981 when a firm disposing of wastes at the Site complied with the disposal notification requirements of Superfund, reporting its use of the Site to EPA.

In May 1983, in response to a local citizen who witnessed the disposal of barrels on the Site property, the South Carolina Department of Health and Environmental Control (SCDHEC) collected samples at the Site and notified EPA of the presence of half-buried drums, many of which were leaking. EPA then performed an emergency **Removal Action** during June and July 1983. This action included removing more than 5,300 fifty-five-gallon

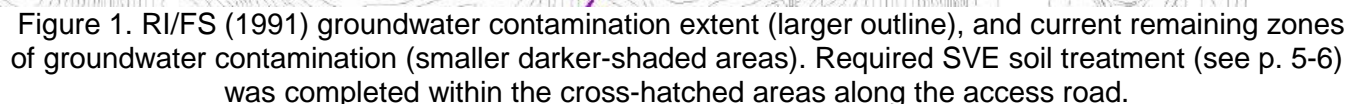
drums and fifteen-gallon containers of waste, 2,100 cubic yards of refuse and contaminated soil, and 70,000 gallons of water and sludge from six small waste lagoons on the Site. The lagoon areas were then backfilled and graded. Testing of the solid and liquid waste materials removed from the property indicated that the primary Site contaminants were **volatile organic compounds (VOCs)**, including trichloroethylene, tetrachlorethylene, and the other compounds listed below in Table 1.

SCDHEC and EPA conducted several investigative studies at the Site during 1983 and 1984. These studies included the sampling of private wells in the vicinity of the site property, a geological study, more extensive groundwater sampling, and a preliminary investigation of area hydrogeology. The Site was proposed for addition to the **National Priorities List (NPL)** in June 1986, and finalized in March 1990.

In January 1988, six **Potentially Responsible Parties (PRPs)** signed an **Administrative Order on Consent (AOC)** with EPA, under which they agreed to conduct an RI/FS at the Site. The RI/FS began in late 1988 and was completed in early 1991. The RI/FS determined the nature and extent of contamination and developed alternatives to address the risks posed by the contamination.

Site Characteristics

The RI/FS determined that soils at the Site in three main subareas, and groundwater, were contaminated with VOCs. No contamination was found in surface water or sediment in Jones Creek, which borders the site to the southeast. No Site ecological risks were identified. Contaminant levels found in soil and groundwater are shown in Table 1. Figure 1 shows the three main soil-contamination areas, and the extent of groundwater contamination both at the time of the RI/FS and the present. The FS estimated that approximately 53,000 cubic yards of contaminated soil, and 24.1 million gallons of



Soil		Groundwater	
MICROGRAMS PER KILOGRAM		MICROGRAMS PER LITER	
Chemical	Cleanup Level ¹	Maximum Detected	Cleanup Level
Acetone	12,000	18	350 ²
1,1-Dichloroethane	100	120	350 ²
1,2-Dichloroethane	60	290	5
1,1-Dichloroethene	270	2,200	7
1,2-Dichloroethene	2,100	31	Cis = 70, trans = 100
1,1,1-Trichloroethane	26,000	3,400	200
1,1,2-Trichloroethane	160	18	5
Trichloroethene	500	720	5
Tetrachloroethene	1,600	230 ³	5
Chloroform	3,000	10	100
Methylene chloride	40	110	5
Benzene	- -	11	5
2-butanone	- -	13	2,000 ²
Chloromethane	- -	26	63 ²

- - Not applicable (not a soil contaminant).

contaminated groundwater, were present on and beneath the site. As further discussed below, cleanup of the contaminated soil was completed in 2004. Site groundwater contamination was shown to be confined within the property boundaries and downgradient from the nearest residence. This residence lies about 250 feet east of Burnt Gin Road, and obtains drinking water from a municipal water line running along the road. Site data have never indicated a groundwater contamination problem in the area immediately around the residence. The Site is currently unused and remains predominantly wooded, with the large grassy area once used for disposal remaining unchanged other than periodic mowing.

As part of the RI/FS, a baseline risk assessment was completed to determine the current and future risks to human health and the environment. The baseline risk assessment is a quantitative estimate of the likelihood of health problems occurring if no cleanup action were taken at a Site. To produce the estimate, the assessment proceeds in four steps.

First, EPA looks at the concentrations of contaminants found at a Site as well as past scientific studies on the effects these contaminants have had on people (or animals, when human studies are unavailable).

Next, EPA considers the different ways that people might be exposed to the contaminants found onsite, the concentrations that people might be exposed to, and the potential frequency and duration of that exposure. These are used to calculate a "reasonable maximum exposure" scenario, the highest level of human exposure that could reasonably be expected to occur.

In the third step, EPA uses the exposure information described above, and combines it with information on the toxicity of each chemical, to assess potential health risks. There are two types of risk: cancer risk and non-cancer risk. The likelihood of any kind of cancer resulting from a Superfund Site is generally expressed as a probability; for example, a "1 chance in 10,000," or 1×10^{-4} . In other words, for every 10,000 people that could be exposed, one extra cancer may occur as a result of exposure to Site contaminants. This means that one

more person could get cancer than would normally be expected to occur from all other causes. For non-cancer health effects, EPA calculates a "hazard index." The key concept is that there is a "threshold level," designated as unity (1.0), below which non-cancer health effects are no longer predicted.

In the final step, EPA determines whether Site risks are great enough to cause health problems for people at or near the Superfund Site. The results of the three previous steps are combined, evaluated and summarized. Results are generated for both current Site use and future Site use. For each, a total cancer risk and total non-cancer risk are calculated.

The regulations that implement Superfund require EPA to strive for cleanups that achieve a benchmark of less than 1 in one million total cancer risk, and a hazard index of less than 1. EPA does have the authority in some situations to approve a cleanup level between 1 in one million (1×10^{-6}), and one in ten thousand (1×10^{-4}).

The baseline risk assessment for the Medley Farm Superfund Site determined that soil contamination did not pose unacceptable risk to Site residents or visitors due to current use, in 1991, or to possible future Site residents. Site groundwater was not (and is not now) being used for drinking water. For these reasons, the baseline risk assessment concluded overall that the Site posed no unacceptable risks under the current land-use situation. However, assuming a future use of the Site as residential, the baseline risk assessment identified a risk to future residents if groundwater beneath the Site were used for drinking. The calculated cancer risk was 1.1×10^{-2} , and the non-cancer hazard index was 5.6.

The risk is present because the levels of contaminants detected in groundwater exceed either the drinking water standards, which are established under the Safe Drinking Water Act, or risk levels calculated in the baseline risk assessment (Table 1). Contaminated soil, while not posing a present or future risk to people, was shown to be a potential source of contaminant leakage and impact to groundwater if left untreated.

1991 Selected Remedy

Based on the RI/FS, a **Record of Decision (ROD)** was issued by EPA on May 29, 1991.

Site Risks and Remedial Action Objectives (RAOs)

The 1991 ROD established a cleanup level for each contaminant of concern (COC) (see Table 1). These cleanup levels were based on federal and state laws and regulations concerning groundwater used for drinking water supply, and on risk-based determinations for those contaminants that did not have a state or federal standard. For soil, the cleanup levels were based on levels that prevent leaching of contaminants to groundwater from the soils.

The goals of the selected remedy (called “remedial action objectives,” or RAOs) were to:

- Eliminate the principal threat posed to human health and the environment;
- Prevent further migration of contaminants from soil to the groundwater; and
- Clean up the affected **aquifer** to drinking water standards, thereby restoring its potential beneficial use as a drinking water source.

No changes to the Site COCs, RAOs, or cleanup levels as detailed in the 1991 ROD, are proposed by this proposed action.

1991 Selected Remedy Description

The selected remedy in the ROD included the following components:

GROUNDWATER: Pump and Treat

- Extract (pump) contaminated groundwater;
- Treat on-site groundwater via **air stripping**, with the need for controlling air stripper emissions to be evaluated in the remedial design;
- Discharge off-site treated groundwater to Jones Creek via a National Pollution Discharge

Elimination System (NPDES) permit; and,
- Continue analytical monitoring of groundwater and surface water.

SOIL: Soil Vapor Extraction (SVE)

- Install a network of air withdrawal (vacuum) wells in the unsaturated zone;
- Construct and operate a pump and manifold system of PVC pipes, to be used for applying a vacuum on the air extraction wells to remove the contaminants from the soil; and,
- Construct an in-line vapor-phase carbon absorption system to trap and absorb the contaminants (organic vapors) out of the soil vapor, prior to its release to the atmosphere.

An Explanation of Significant Differences (ESD) was issued in December 1993, which slightly modified the remedy selected in the 1991 ROD. The ESD removed the requirement that air emissions from the SVE system be treated using activated carbon absorption filters. Engineering calculations made during the remedial design demonstrated that the expected emissions would fall well below levels which could pose an unacceptable risk to public health, and below discharge permit levels under state and federal laws and regulations. Measurements made during the operation of the SVE system confirmed the rationale for this change.

A second ESD was issued in September 2010, which added the requirement that institutional controls in the form of restrictive covenants to prevent use of the groundwater or installation of groundwater wells, be implemented on the property as part of the groundwater remedy. No such controls were in the original Site remedy.

Remedy Implementation

After a design phase (1993), construction of both the SVE system to treat soils, and a ground water extraction and treatment system consisting of 11 wells to treat groundwater, was completed in 1995. Both systems operated continuously until September 2004. As of that date, the groundwater pump-and -treat system had captured more than 100

million gallons of groundwater and removed about 250 pounds of VOCs. More than 2,250 pounds of VOCs had been removed by the SVE system.

Basis for the ROD Amendment

By September 2004, as determined by confirmatory sampling results, Site soil had been cleaned up to the cleanup levels specified in Table 1 above. At that time EPA approved shutdown of the SVE system. Concurrently, based on declining performance from the groundwater pump-and-treat system, EPA approved halting operation of the groundwater pump-and-treat system. The performance decline was evident in data from both the annual total pounds of VOCs removed, and the rate of removal per unit of groundwater:

YEAR	LBS. COCs REMOVED	REMOVAL RATE*
1995	57	5.3
2002	13	1.5

* Per million gallons of groundwater treated.

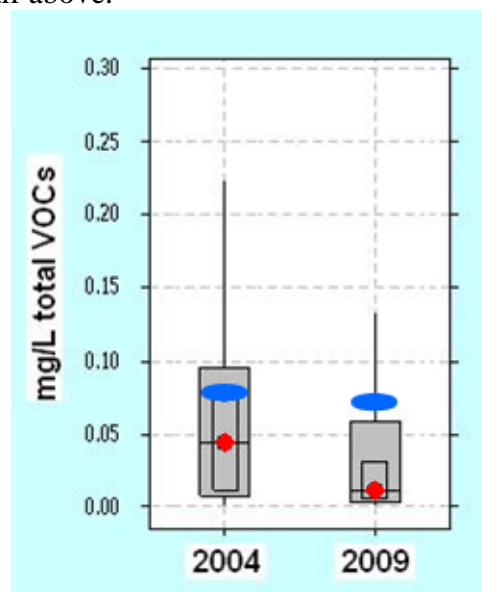
At this same time EPA approved the PRPs' request to implement a "technical maximization measure" as allowed under the ROD, to serve as a "polishing step" to reduce the remaining COCs in Site groundwater to below the cleanup levels. The measure, referred to as the "supplemental RA," consists of an in-situ (in-place) **enhanced reductive dechlorination (ERD)** treatment process for groundwater. The treatments are performed as groundwater injection events in which nutrient (lactate) solutions are placed into the affected groundwater, followed by a "rest period" during which groundwater flow distributes the solutions in the aquifer, and conditions return to their pre-injection state. A sampling event then follows, to gauge the degree and areal influence of the event.

Between October 2004 and March 2010, six ground water nutrient injections were administered in order to enhance the natural biodegradation of lingering contaminants in the ground water, each followed by a monitoring period before sampling. Reports on the progress of the treatments, and EPA reviews of the

reports, indicate that in general contaminant levels in groundwater have been reduced significantly in wells across the site. The results have not been uniform in all wells, and some portions of the site still have groundwater above the cleanup levels. However, the overall results have been very good and reflect significant progress. The darker portions of the oval-shaped area on Figure 2 indicate the remaining, smaller areas of groundwater contamination with concentrations above the groundwater cleanup levels.

Progress can also be demonstrated by considering "boxplot" diagrams that show Site groundwater COC levels in 2004, and in 2009, when EPA completed a statistical analysis of 2000-2009 groundwater data for the Third Five-Year Review. Boxplots visually present sets of data that have been statistically analyzed, in an easily-understood way.

In the graphic below, the top and bottom of each box represents the minimum and maximum of data points (COC levels at individual wells) present at between 25% and 75% of the maximum found; the maximum is the top of the vertical line. The blue oval, above the 2009 box and in the upper part of the 2004 box, represents the mean, or average, COC level in Site wells. The red diamond with horizontal line across the box middle is the "median," a level at which COC levels in half of the wells are below, and half above.



The boxplots above illustrate that groundwater COC levels have been significantly reduced, as can be seen particularly for the median (red diamond). The mean (blue oval) has not been reduced as far, because while many wells no longer have COCs above the goals, the few that remain above are those with higher COC levels.

While the technical maximization measure (the supplemental RA) has partly fulfilled the purpose of employing it as described in the 1991 ROD, the length of time it has been underway has exceeded EPA's plans and expectations.

Considerable progress has been made on cleaning up groundwater since 1991. In addition, the institutional control described above, to limit Site uses, was implemented in May 2009. However, because contaminated groundwater remains at the Site above cleanup levels, it is EPA's current judgment that additional actions, such as those presented in the Preferred Alternative or one of the other active measures identified in this Proposed Plan, are necessary to continue to protect public health, welfare or the environment from actual or threatened releases of hazardous substances into the environment.

Summary of Remedial Alternatives

In order to consider whether and how to modify the 1991 ROD and selected remedy, EPA directed the PRPs to prepare a Focused Feasibility Study (FFS) to describe and compare ERD to a range of different alternatives to meet cleanup levels and achieve remedial action objectives for groundwater. The report was completed in December 2011 and is available in the Site Administrative Record (see page 1).

The FFS screened a variety of remedial (cleanup) technologies that could potentially be used, and assembled them into five alternatives. Each of the alternatives, and its cost in current dollars, is described below.

All of the alternatives include periodic continued monitoring of Site groundwater and surface water, and maintaining existing institutional controls (land use restrictions) that are already in place. Also, each alternative includes a \$25,000 cost every five years for a "Five-Year Review," a report that evaluates the progress of the cleanup action. Five-Year Reviews are required under Superfund when hazardous substances remain at a Site above levels that would allow for unlimited use and unrestricted exposure. "Capital costs" are one-time, up-front expenditures necessary to implement the alternative. "Annual operations/maintenance costs" are expended each year over the estimated necessary time period to meet cleanup levels. "Net present worth cost" is a useful comparative financial analysis that gives the total cost of an alternative, capital costs plus annual costs, over the full time period of its implementation, in terms of today's dollar value. A 7% discount rate was used to project net present worth costs. Cost estimates are expected to be accurate within a range of +50 to -30 percent.

Alternatives 2 through 5 share a degree of uncertainty about how much time would be required to reach cleanup levels and remedial action objectives. The "estimated time" presented below for each alternative reflects EPA's best judgements at present, based on Site data and on experience with the remedial technologies currently available.

Alternative 1: No Action

Estimated Capital Cost: None

Estimated Annual O&M Cost: \$32,000

Estimated Net Present Worth Cost: \$452,300

Estimated Construction Timeframe: none

Estimated Time to Achieve RAOs: Unknown

Under the No Action alternative, the Site is left "as is" and no funds are expended for the control or cleanup of the contaminated groundwater. If no action is taken, future risks to potential persons living on or working at the Site will persist for an extended period of time. Although no funds would be expended for cleanup, funds would be required for monitoring groundwater contaminant

concentrations in order to conduct Five-Year Reviews.

Alternative 2: Monitored Natural Attenuation (MNA)

Estimated Capital Cost: None
Estimated Annual O&M Cost: \$111,700
Estimated Net Present Worth Cost: \$1.44 million
Estimated Construction Timeframe: none
Estimated Time to Achieve RAOs: 30 years

“Natural Attenuation” refers to natural processes by which microbes (microscopic lifeforms such as bacteria) break-down VOCs including those which are the Site COCs here, in addition to other naturally-occurring processes that can reduce COC levels. “Monitored Natural Attenuation,” or MNA, refers to an EPA-approved protocol by which the occurrence and rate of MNA are carefully documented, so that it can be employed as a groundwater cleanup technology. In practice, periodic groundwater monitoring is performed to track progress in reducing the site-wide distribution of COCs. MNA monitoring follows detailed current EPA guidance. An estimated 30 years would be required to meet the Site cleanup goals.

Alternative 3: Groundwater Recovery, Treatment, Discharge

Estimated Capital Cost: \$165,000
Estimated Annual O&M Cost: \$343,400
Estimated Net Present Worth Cost: \$3.5 million
Estimated Construction Timeframe: 3-5 months
Estimated Time to Achieve RAOs: 20 years

Under this alternative, groundwater pumping and treatment as conducted between 1995 and 2004, as the original Site remedy from the 1991 ROD, would be resumed. The existing pumping wells and water treatment system would be retrofitted, upgraded, and restarted to resume site-wide groundwater capture, in order to attempt further VOC concentration reduction within the remaining areas of residual groundwater contamination. After treatment, groundwater would (as before) be discharged to Jones Creek via the existing NPDES

discharge outfall. An estimated 20 years would be required to meet the Site cleanup goals.

Alternative 4: Enhanced Reductive Dechlorination (ERD)

Estimated Capital Cost: \$150,000
Estimated Annual O&M Cost: \$245,000
Estimated Present Worth Cost: \$1.51 million
Estimated Construction Timeframe: 6 months
Estimated Time to Achieve RAOs: 10 years

Enhanced Reductive Dechlorination (ERD), which has been used at the Site as described above, is an active treatment process for groundwater. Treatment events begin with the injection of a nutrient (lactate) solution into the affected groundwater, through one or more wells. The lactate solution has two effects: it provides a food source that fosters the growth and activity of microbial populations that consume (breakdown) the Site COCs, and it causes chemical conditions to become more favorable for such growth and activity. The resultant break-down activity is the same as described above with MNA, but it is enhanced through performance of the treatments. After injection, a rest period follows during which groundwater flow distributes the solutions in the groundwater, followed by a groundwater sampling event to determine the degree and areal extent of the treatment. The capital costs shown above provide for an expansion of the injection system infrastructure. The FFS estimated that a five-year period of annual injection treatments (5 treatments) would be followed by a five-year groundwater monitoring period.

Alternative 5: In-Situ Chemical Oxidation (ISCO)

Estimated Capital Cost: \$375,000
Estimated Annual O&M Cost: \$408,400
Estimated Present Worth Cost: \$1.97 million
Estimated Construction Timeframe: 6 months
Estimated Time to Achieve RAOs: 10 years

In-Situ Chemical Oxidation (ISCO) involves the injection of treatment solutions into the affected groundwater in a similar manner as is performed in implementing ERD. In this case however, the

solutions contain strong chemical oxidizers capable of chemically degrading Site COCs. The breakup of the COCs is a direct chemical effect, not involving microbiological activity as with Alternatives 2 and 4. As with ERD, the process involves a rest period following injection, followed in turn by a groundwater sampling event, to evaluate results. Capital costs for ISCO include a Pilot Study (testing on how best to employ the technology, \$75,000), and a larger cost (\$300,000) to construct a suitable treatment infrastructure (pipes, lines, wells) to deliver the treatment solutions into the affected aquifer. The FFS estimated that a three-year period of annual injection treatments (3 treatments) would be followed by a seven-year groundwater monitoring period.

Evaluation of Remedial Alternatives

Superfund requires that nine specific criteria be used to evaluate the different remediation alternatives individually and against each other, in order to select a remedy. Please see the FFS for detailed alternative descriptions, including how and to what degree each meets the nine criteria. This section of the Proposed Plan compares the performance of each alternative against the others. Under each criterion below, a summary is presented from the FFS.

The first two criteria are referred to as “threshold criteria” because any alternative must meet both of them in order to be selected.

The third through seventh criteria, Nos. 3 through 7 below, are “balancing criteria” that are considered in order to distinguish between alternatives, and to identify their strengths and weaknesses.

The final two criteria, State/ Support Agency Acceptance and Community Acceptance, are “modifying criteria” that EPA is required to consider before making a remedy decision. After this Proposed Plan is issued and community involvement activities are completed, EPA will carefully consider any public input or comments

received. EPA may change or modify its Preferred Alternative selection based public comments or feedback.

1. Overall Protection of Human Health and the Environment

Judgement on this criterion considers whether, and to what degree, an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

Alternatives 2, 3, 4, and 5 would be expected to meet this criterion. Each does so through directly implementing treatment of groundwater, although the method of treatment varies. In the case of Alternative 2, MNA, the treatment occurs through natural processes alone, but is monitored using an EPA-approved protocol to ensure eventually reaching the site cleanup levels. Alternative 1, No Action, might at some future point meet the cleanup levels (and thus meet this criterion and the ARARs requirement below), but without the monitoring described above for MNA, the rate of progress and timeframe for reaching the cleanup goals could not be projected or verified. In view of this, the No Action Alternative is not considered further below.

2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Compliance with **Applicable or Relevant and Appropriate Requirements (ARARs)** considers whether the alternative meets Federal and State environmental statutes, regulations, and other requirements that apply to the Site, or whether a waiver is justified.

Alternatives 2, 3, 4, and 5 all would accomplish compliance with ARARs if implemented properly. Thus the alternatives are equal under this criterion.

3. Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to the ability of an alternative to maintain protection of

human health and the environment over the long term.

Alternatives 4 and 5 would provide long-term effectiveness and permanence through successful treatment of the groundwater. In both cases, the treatment is permanent and irreversible.

Alternatives 2 and 3 achieve somewhat less effectiveness and permanence than Alternatives 4 and 5. Alternative 3 (groundwater recovery and treatment) may experience “rebound” effects (a temporary COC increase) upon system shutoff, or, COC levels may “level off” above cleanup levels, based on experience at other Superfund sites. These impact the permanence of the treatment. With MNA (Alt. 2) the treatment is permanent, but since natural conditions are allowed to prevail over a longer period of treatment time, there is more uncertainty that natural conditions will continue to favor the ongoing break-down of Site COCs.

4. Reduction of Contaminant Toxicity, Mobility or Volume through Treatment

This criterion is a consideration of whether, and to what degree, an alternative uses treatment to reduce the harmful effects of the Site COCs, their ability to move in the environment, and the volume of contamination present.

Alternatives 2, 3, 4, and 5 all would accomplish reduction of these characteristics. However, under Alternative 2 the volume of affected groundwater could increase for some period before COC reductions are completed. This would not be expected with Alternative 3 because recovery (pumping) of the affected groundwater would reduce its mobility and volume. However, past experience in the original Site remedy, which was groundwater recovery and treatment, suggests the likelihood that performance will eventually level off at a point well above the Site cleanup levels, so that toxicity of the COCs would remain.

5. Short-term Effectiveness

Short-term effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.

Alternatives 4 and 5 will require the least time to achieve the Site cleanup levels, compared to the others. However, Alternative 5 could involve short-term health risks to workers who will be handling the strong chemicals needed to prepare the treatment solutions for implementing ISCO. Alternative 3 would initially achieve some fast reductions in COC levels in Site wells; however, past experience suggests the “leveling off” problem noted above would reoccur, lengthening the time needed to meet the Site cleanup levels. Alternative 2 would likely require the longest time to meet the cleanup levels, among Alternatives 2, 3, 4, and 5.

6. Implementability

Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.

Alternatives 4 and 2 would be easiest to implement. Implementing either one would be straightforward and not require new studies or new site activities. Alternative 3 would involve retro-fitting new pumping components into the pumping wells before operations could resume. To implement Alternative 5, performance of laboratory or field/pilot-scale studies would be necessary in order to design the specific plans and infrastructure (i.e. pipes, lines, wells) for treating the aquifer.

7. Cost

Cost is a consideration of the total funds that must be expended to achieve the Site cleanup goals.

Alternatives 2, 4, and 5 have comparable costs of between \$1.44 and 1.97 million. Alternative 3 is the most costly at \$3.5 million.

8. State/Support Agency Acceptance

Considered here is whether the State agrees with EPA's analyses and recommendations, as described in the Focused FS and the Proposed Plan. SCDHEC has remained involved with all Superfund activities related to the Medley Farm Superfund Site, and supports the Preferred Alternative.

9. Community Acceptance

Community acceptance considers whether the local community agrees with EPA's analyses and its preferred alternative. Comments received on this Proposed Plan are an important indicator of community acceptance. Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the ROD Amendment for the Site.

Summary of the Preferred Alternative

The Preferred Alternative for cleaning up contaminated groundwater at the Medley Farm Superfund Site is Alternative 4, Enhanced Reductive Dechlorination (ERD). This alternative is recommended because it achieves the best degree of overall protection of human health and the environment, complies with ARARs, and to a degree equal to or superior to the other alternatives, provides long-term effectiveness and permanence; reduces the toxicity and volume of Site COCs; is effective in the short-term and is easily implementable; and is cost effective. Compared to Alternatives 2 and 3, the Preferred Alternative (ERD) will require less time to reach the Site RGs. Compared to Alternatives 3 and 5, it can be more easily implemented, and it is more cost-effective than Alternative 5.

Contingency

Alternative No. 2, Monitored Natural Attenuation (MNA), is selected as a Contingency Remedy in the event that it is demonstrated that the Preferred Alternative cannot meet the cleanup levels sooner

than MNA would meet them, and that the ongoing natural attenuation processes will bring Site groundwater COC levels below the cleanup goals in an acceptable length of time. The reason for selecting this Contingency is that both MNA and ERD rely on certain geochemical conditions that are favorable for **biological degradation** (a major component of natural attenuation) to occur, and Site data and results to date indicate that these conditions will persist for long periods after the ERD treatment solutions are no longer detected in the aquifer. Under these conditions, MNA may be employed to further reduce levels of Site COCs in groundwater.

With EPA's approval, a monitoring period will be conducted in order to allow the Site groundwater regime to return to natural, ambient conditions no longer influenced by the treatment injections conducted since 2004. After this initial first-phase monitoring period is completed and EPA evaluates the data, EPA may approve starting a second monitoring phase focused on evaluating the rate and progress of natural attenuation processes. In accordance with the "lines of evidence" described in EPA's MNA Guidance, the monitoring data must demonstrate that natural attenuation is occurring at a rate that will lead to meeting cleanup levels in an acceptable time frame. When data support such a finding, EPA will approve the transition of the remedy for that portion of the site from ERD to the Contingency Remedy, MNA. EPA will approve the transition upon completion of an Explanation of Significant Differences (ESD), which will explain the remedy modification to the public.

Based on the information available at this time, EPA and the State of South Carolina believe the Preferred Alternative, Alternative 4, Enhanced Reductive Dechlorination, would be protective of human health and the environment, comply with ARARs be cost effective, and utilize permanent solutions and alternative treatment technologies to the maximum extent practicable.

The Preferred Alternative can change in response to public comment or new information.

Statutory Determinations

Based on the information available at this time, EPA has determined that these fundamental changes comply with the statutory requirements of CERCLA §121, 42 U.S.C. §9621, are protective of human health and the environment, comply with Federal and State requirements that are applicable or relevant and appropriate to the remedial action, are cost-effective, and utilize permanent solutions and alternative treatment technologies to the maximum extent practicable.

Because the contaminated groundwater remaining at the Site contains hazardous substances, pollutants, or contaminants on Site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted no less often than each five years after the initiation of the remedial action to ensure that the remedy is, or will be, protective of human health and the environment. The most recent Five-Year Review was completed on September 1, 2009. Five-Year Reviews will continue as long as contamination that prohibits unlimited use of the property remains on the Site.

Community Participation

EPA and SCDHEC provide information regarding the cleanup of the Medley Farm Superfund Site to the public through public meetings, the Administrative Record file for the Site, EPA's website (<http://www.epa.gov/region4/waste/npl/nplsc/medleysc.htm>), and announcements published in the local paper, *The Gaffney Ledger*. EPA and the State encourage the public to gain a more comprehensive understanding of the Site and the Superfund activities that have been conducted. The dates for the public comment period, the date, location, and time of the public meeting, and the locations of the Administrative Record files, are provided on the front page of this Proposed Plan. EPA will consider written comments received on or prior to April 5, 2012, in preparing the final version of the ROD Amendment. Please direct written comments to:

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GLOSSARY

Air Stripping: A treatment process used to remove volatile chemicals (such as VOCs) from water or groundwater. The process consists of vigorously forcing air through the water stream (bubbling) and/or spraying the water onto specially-designed media, which serves to foster and greatly speed up evaporation of the contaminants into the air, releasing them from the water in which they formerly were dissolved.

Administrative Order On Consent (AOC): A legal agreement signed by EPA and an individual, business, or other entity through which the violator agrees to pay for correction of violations, take the required corrective or cleanup actions, or refrain from an activity. It describes the actions to be taken, may be subject to a comment period, applies to civil actions, and can be enforced in court.

Administrative Record: A file which contains all information used by the lead agency to make its decision on the selection of a response action under CERCLA. This file is required to be available for public review, and a

copy is to be established at or near the Site, usually at the information repository. A duplicate file is maintained in a central EPA location, in this case at the regional EPA offices in Atlanta, Georgia.

Applicable or Relevant and Appropriate Requirements (ARARs): These requirements apply to the selected remedy EPA chooses in a decision document such as a ROD or Proposed Plan. The requirements come from federal or state laws and regulations, and may be directly applicable to an action, chemical, or location (such as a natural wetland) because they were established for just that purpose. Or, the requirement may be judged by EPA to be “relevant and appropriate” to the action, chemical or location, even though the requirement may not have been established for the specific role it would serve in the selected remedy.

Aquifer: A geologic unit or formation capable of producing a large enough quantity of water to serve as a source of potable (drinking) water, typically through wells or springs.

Biological Degradation: This term refers to the ability of microorganisms such as bacteria to break apart and destroy certain organic compounds, including trichloroethylene (TCE), one of the Site COCs at the Medley Farm Superfund Dump Site.

Enhanced Reductive Dechlorination (ERD): Reductive dechlorination is a process in which chlorine atoms are replaced, in step-wise fashion, by hydrogen atoms, thus breaking up and changing the chemical structure of a chlorine-bearing organic compound. Certain types of bacteria foster and control this process as a means of gaining energy. With enhanced reductive dechlorination, water-based solutions are placed in groundwater to assist and encourage microorganisms to accomplish the breakdown of chlorinated compounds.


Explanation of Significant Differences (ESD): An ESD is a document prepared by EPA or the lead agency under Superfund, to document its decision to make a significant change to the remedy selected for use at a Superfund site. An ESD describes to the public the nature of the significant changes, summarizes the information that led to making the changes, and affirms that the revised remedy complies with the NCP and the statutory requirements of CERCLA.

National Oil and Hazardous Substances Contingency Plan (NCP): The federal regulation which guides the implementation of the Superfund program (CERCLA). The NCP also guides the implementation of other programs intended to prevent or control oil and/or hazardous substance spills into the nation’s surface waters and other specific portions of the environment.

National Priorities List (NPL): EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under Superfund.

Plume: A three-dimensional zone within the groundwater, i.e. having length, width and depth, which contains contaminants and generally moves in the direction of, and with, groundwater flow.

Potentially Responsible Parties (PRPs): Any individual(s) or company(s) (such as owners, operators, transporters, or generators) potentially responsible for, or contributing to, the contamination problems at a Superfund Site. Whenever possible, EPA compels PRPs, through administrative and legal actions, to clean up hazardous waste Sites for which they are responsible.



Record of Decision (ROD): A public document which explains how EPA reached a decision to select a cleanup alternative to be used at an NPL Site. The ROD is based on information and technical analyses generated during the Remedial Investigation/Feasibility Study, and upon consideration of public comments and community concerns.

Removal Action: Short-term immediate actions taken to address releases of hazardous substances that require expedited response. Removal actions address immediate, serious, short-term threats to human health and the environment

Remedial Investigation/Feasibility Study (RI/FS): Two distinct but related studies, usually performed concurrently, and together referred to as the "RI/FS." They are intended to gather the data necessary to determine the type and extent of contamination at a Superfund Site; establish criteria for cleaning up the Site; identify and screen possible technologies that could be employed; assemble those that could be used into cleanup alternatives; and to analyze and compare in detail the strengths, weaknesses and costs of the alternatives.

Soil Vapor Extraction (SVE): Also known as "soil venting" or "vacuum extraction", SVE is an *in situ* ("in-place") cleanup technology that reduces concentrations of volatile organic compounds (VOCs) in soils located in the unsaturated zone (i.e., above the water table). An SVE system applies a vacuum through extraction wells which are installed within areas of contaminated soil, drawing in and circulating air. In response to the flow of air, VOCs in soil "evaporate" into vapors which are drawn into the wells. Vapors are then treated (commonly with activated carbon) if treatment is necessary before being released to the atmosphere.

Superfund: "Superfund" is the common name for the program operated under the legislative authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, 42 U.S.C. Section 9601 et seq. The Superfund law required EPA to establish the Superfund program to address the nation's worst and most serious uncontrolled and/or abandoned hazardous waste sites. Contaminated sites are discovered by citizens, businesses, and local, state, or federal agencies.

Volatile Organic Compound (VOC): An organic (carbon-containing) compound that evaporates (volatilizes) readily at room temperature. Many VOCs are chlorinated (chlorine-bearing) solvents, such as trichloroethylene (TCE) and tetrachloroethylene (also called perchloroethylene, or PCE). VOCs are common industrial contaminants at environmental sites.